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ABSTRACT

Three studies were performed to investigate the effects of training versus instructions in the acquisition of cognitive learning strategies. Groups of undergraduate students were taught to use one or more strategies. The amount and type of training differed for each of the experimental groups. Strategies taught included the method of loci, imagery, verbal elaboration, and grouping. Study and test materials included serial, free recall and paired-associate word lists as well as reading passages. The results partially support the need for training, which includes practice and feedback, to facilitate the acquisition of cognitive learning strategies. However, the amount of training necessary to optimize learning appears to be dependent upon several factors, such as the difficulty level of the materials with which the strategies will be used and the types of tests used to assess what has been learned. (Author)

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Technical Report 460

TRAINING VERSUS INSTRUCTIONS IN THE ACQUISITION OF COGNITIVE LEARNING STRATEGIES

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Three studies were performed to investigate the effects of training versus instructions in the acquisition of cognitive learning strategies. Groups of undergraduate students were taught to use one or more strategies. The amount and type of training differed for each of the experimental groups. Strategies taught included the method of loci, imagery, verbal elaboration, and grouping. Study and test materials included serial, free recall and paired-associate word lists as well as reading passages. The results partially support the need for training, which includes practice and feedback, to facilitate the acquisition

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FOREWORD

The Personnel and Training Research Laboratory of the Army Research Institute for the Behavioral and Social Sciences (ARI) conducts research to support training methods to optimize skill acquisition and retention. A variety of research is being conducted on the effects of various learning strategies on skill acquisition and retention. ARI, in cooperation with the Defense Advanced Research Projects Agency (DARPA), is especially interested in training that improves the trainee's ability to learn.

This report is one of a series on the development of the Cognitive Learning Strategies Training Program. This report discusses training versus instructions in the acquisition of cognitive learning strategies. Research was conducted at the University of Texas at Austin with the assistance of David C. Duty, Thomas P. Washington, Diane Wiener, and Rita Ischy. It was done under contract DAHC19-76-C-0026, monitored by Joseph S. Ward of ARI under Army Project 2Q161102B74F, and funded by DARPA.

JOSEPH ZEIDNER
Technical Director

TRAINING VERSUS INSTRUCTION IN THE ACQUISITION OF COGNITIVE LEARNING STRATEGIES

BRIEF

Requirement:

To investigate the effects of training versus simple instruction in the acquisition of cognitive learning strategies.

Procedure:

A series of three studies was conducted. In the first study, 77 undergraduate students were randomly assigned to one of three groups: feedback, no-feedback, and control. Students in both experimental groups received written directions concerning the properties of effective learning strategies and practiced using these strategies to learn the information contained in a series of 12 learning tasks. In addition, students in the feedback group received individual feedback from the experimenter about their use of the strategies on the practice tasks.

In the second study, 100 undergraduate students were randomly assigned to five groups: standard instruction, elaborated instruction, training, elaborated training, and control. Students in the four experimental groups were taught to use the method of loci, a cognitive strategy used to learn and recall lists of words in a specific order. While the two instruction groups were simply told how to use this strategy, the two training groups received more extensive explanations and practice. The elaborated instruction and training groups were taught to use a story line to make the loci more memorable.

In the third study, 36 undergraduate students were assigned to either an instruction or a training group. Students in both groups were taught to use the following three cognitive learning strategies: imagery, verbal elaboration, and grouping. The training group received explanations of the strategies, numerous examples of their use, provisions for practice in using them, and verbal feedback from the experimenter. The instruction group also received explanations of the strategies but the descriptions were less detailed, there were fewer examples, and no feedback was provided by the experimenter.

Findings:

The results partially support the need for training, which includes practice and feedback, to facilitate the acquisition of congnitive learning strategies. However, the amount of training necessary to optimize learning appears to be dependent upon several factors, such as the difficulty level of the materials with which the strategies will be used and the types of tests used to assess what has been learned.

Utilization of Findings:

The enhancement of certain types of learning through the acquisition of cognitive learning strategies has been demonstrated.

The need for training to facilitate the acquisition and use of cognitive learning strategies was indicated, particulaly when difficult tasks and materials are used.

A need for further research concerning the use of cognitive learning strategies and the optimal procedures required to teach them to learners was identified.

TRAINING VERSUS INSTRUCTIONS IN THE ACQUISITION OF COGNITIVE LEARNING STRATEGIES

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TRAINING VERSUS INSTRUCTION IN THE ACQUISITION OF COGNITIVE LEARNING STRATEGIES

Introduction

As scholastic achievement scores continue to decline nationally, many psychologists, educators, and parents have realized the need for educational reform. The thrust of much of the criticism of current educational practices centers around the dearth of effective instructional procedures which could enhance students' abilities to learn. Basic to this problem is the belief that students will learn simply because they have been assigned a task and have been provided with an appropriate text or other instructional aid. The underlying assumption that every student will somehow innately or automatically acquire the skills necessary to learn and remember new information is misleading. While many students do develop these skills on their own, little has been done to systematize the process of teaching learning skills.

Effective learning strategies, such as the method of loci, have been available for hundreds of years (Bower, 1970). However, the scientific study of these strategies has been neglected until recently. Within the last few years a number of researchers have investigated several types of highly effective learning and memory techniques involving elaboration of the material that is to be learned (Bower, 1970; Norman, 1976; Weinstein, 1978). Elaboration strategies enable the learner to enhance the meaningfulness of information to be learned by relating this new information to the learner's current knowledge, or cognitive structure.

A study by Weinstein (1978) investigated the effects of an elaboration skills training program upon the learning efficiency of ninth grade

students. A variety of learning strategies, learning tasks, and stimulus materials were chosen to provide the learners with guided practice in the use of elaborative mediational skills. Unlike previous studies, a variety of cognitive strategies including sentence elaboration, imaginal elaboration, analogies, drawing implications, creating relationships, and paraphrasing were included in the training. The learning tasks selected ranged from simple paired-associates and free recall to reading comprehension. Stimulus materials were drawn from ninth grade curriculum materials in science, history, English, foreign language, and vocational education.

In this study, 75 ninth-grade students were randomly assigned to one of three groups: training/experimental, control, or posttest-only. Students in the experimental group participated in a series of five 1-hour elaboration skill training sessions, administered at approximately 1-week intervals. Students were exposed to a set of 19 learning tasks. They were required to create a series of elaborators, or mediational aids, for each of these tasks. Experimenter-provided directions for the early tasks emphasized the properties of an effective elaborator. The latter training sessions provided opportunities for additional practice in using these skills with little or no experimenter-provided instructions. Students in the control group were exposed to the same stimulus materials but their task was simply to learn the information without any type of strategy prompts or directions. A posttest-only group was not exposed to the stimulus materials but did participate in the posttesting sessions. The immediate posttest was administered 1 week after the conclusion of the training and the delayed posttest was administered approximately 1 month later. Both immediate and delayed posttests consisted of reading comprehension, free recall, paired-associate, and serial recall tasks.

The results of the data analyses for the immediate posttest revealed significant differences between group means on the free recall task and Trial 2 of the paired-associate learning task. In each instance the experimental group's performance surpassed the performance of the control and posttest-only groups, which did not differ significantly from each other. On the delayed posttest a significant difference was obtained for the reading comprehension task and Trial 1 of the serial learning task. Again these differences favored the experimental group. It seemed that students could learn to utilize these elaboration strategies in a variety of task situations but further research was still required to determine the optimal conditions for their learning and use.

As research attesting to the utility of these strategies accumulates, the issue of how to effectively and efficiently teach these skills arises: is it sufficient to simply instruct students in their use, or is extensive training needed? If simply instructing learners in the use of cognitive strategies is equivalent to more extensive training and practice, this could save a great deal of time, money, and other resources when such skills are taught in academic or training settings. However, it may be that extensive training is necessary to adequately develop these strategy skills. The following series of studies was conducted to help resolve this issue.

The Effect of Corrective Feedback in an Elaboration Strategies Training Program for College Students

One of the first experiments conducted as part of this research program was a replication of the previously discussed cognitive strategy training study by Weinstein (1978). The present study attempted to extend the findings to a college-age population. Also investigated was the effect of corrective feedback in teaching students to employ cognitive strategies.

Method

Participants. The 77 students who participated in this study were drawn from several sections of an introductory educational psychology course at the University of Texas at Austin. Participation in research was part of their course requirement.

Materials. The 12 learning tasks were drawn from the original set used by Weinstein (1978). A variety of topics was included in these training materials, such as recalling telephone numbers, reading a passage about Sam Houston, and a passage on distinguishing arteries from veins. In selecting the materials to be used in the present study, serial-like tasks were omitted because of the limitations of available time, and because such tasks had not yielded significant group differences in Weinstein's study. Also, unlike the previous study, the materials were each typed on a separate sheet of paper, with directions and suggested strategies preceding the task itself. The purpose of presenting all of the materials in written rather than verbal form was to standardize the presentation of the instructions for both feedback and no-feedback groups.

The paired-associate and free recall posttests were the same as those administered by Weinstein (1978). Her lists were constructed by random selection from a pool of 154 words chosen from the norms published by Paivio, Yuille, and Madigan (1968) such that their concreteness ratings were in the range of 3.00 to 5.50 (based on a 7-point scale) and their meaningfulness ratings were in the range of 4.75 to 6.75 (representing the average number of associates given by an individual in a 1-minute period). The reading comprehension passages and questions were chosen from the Science Research Associates, Inc. (SRA) Lab IVa (1954) materials.

The passages included a twelfth-grade-level reading about the role of males in the family and a thirteenth-grade-level reading about the history of immunity from self-prosecution.

Design and Procedure. Students were randomly assigned to one of three groups: feedback (N = 28), no-feedback (N = 26), and control (N = 23). Students in each of the three conditions met in groups of four to seven for each of four 50-minute sessions. The four sessions were separated by 1-week intervals. Each of the first three sessions consisted of the presentation of four learning tasks, requiring approximately 10 minutes per task. Students in both the feedback and no-feedback groups received written directions concerning the properties of effective elaboration strategies and suggestions for using strategies considered appropriate for each task. Students in both of these groups were required to create a series of elaborators, or mediational aids, for each of the learning tasks. Directions and suggestions became less specific for the later tasks as the students became more adept in using the techniques. (A copy of the directions and these task materials can be found in Appendix A.)

The feedback and no-feedback groups received the same directions except that the feedback group was told that the experimenter would look at their learning aids. As the students were working on the tasks, the experimenter spoke individually with each student in the feedback group to discuss their aids and provide supportive and directive feedback and guidance. This included agreeing with the student that some of the tasks were difficult, and suggesting an example of a mediational aid for those who were having difficulty, as well as encouraging those students who were producing appropriate aids. Students whose aids indicated that they

had missed the intent of the directions were provided with a verbal summary of the directions and given additional examples of appropriate mediators. As the sessions progressed and the students became more skilled, less direction was provided by the experimenter.

Students in the no-feedback group received the same tasks and directions but did not receive any feedback or guidance from the experimenter. The control group also received the same tasks to learn, but were only told to learn the materials on the task sheet. No suggestions as to how they might try to learn this material were provided.

Testing occurred during the fourth session. All students were tested on paired-associate, free recall, and reading comprehension tasks, in that order.

For the paired-associate test, 21 word pairs were presented one at a time on a Da-Lite screen using a Kodak slide projector with an automatic timing device. The study-test method was used with an 8-second exposure of each pair for the study portion and an 8-second exposure of each stimulus for the test portion of each trial. Two complete trials were given to all students. The word pairs and the stimuli were presented in different random orders on each trial.

The free recall test included 20 words which were presented one at a time at the rate of 6 seconds per word. After all words were presented, the students were given 2 minutes to write down as many of the words as they could remember without regard to the order of presentation.

For the reading comprehension test, students were given 5 minutes to study the reading selection. These were then collected and a sheet of questions was distributed. Students were given 3 minutes to answer 10 questions about the reading. This procedure was also followed for a second

reading task.

Results and Discussion

Paired-Associate Learning. A two-way analysis of variance (groups x trials with repeated measures on trials) indicated a significant interaction between groups and trials ($F(2,74) = 4.33$, $p < .02$), as well as a significant main effect due to groups ($F(2,74) = 5.04$, $p < .01$) (see Tables 1 and 2). On Trial 1, the feedback and no-feedback groups did not differ from each other, but both groups did perform better than the control group. The control group benefited most from the second trial, where its performance was not different from the other two groups. Thus, the use of learning strategies aided in recalling the word pairs for Trial 1, but the addition of feedback did not seem to have an effect. These findings are in contrast to those of Weinstein's (1978) study. For her ninth-grade students, the significant difference was between the experimental and combined control/posttest-only groups on Trial 2 of the paired-associate test ($p < .05$). She concluded that at the early stages of mediational skill acquisition, greater time and practice may be required for the creation of mediational aids than was allowed in the first trial in her study. The results of the current research would indicate that this may also depend on the age or educational level of the students.

Free recall. The results of a one-way analysis of variance indicated no significant difference between the groups (see Table 3). Weinstein (1978) found significant differences between the experimental and combined control/posttest-only groups ($p < .01$). It is possible that the discrepancy found in these two sets of data is due to the nature of the task itself. Free recall is the least structured of the tasks included in the posttest. It may be a moderately difficult task for ninth graders, but fairly simple

TABLE 1

Source Table for Analysis of Variance of the

Paired-Associate Learning Task

Scores in the Effect of Corrective Feedback Study

Source	SS	df	MS	F	p
Groups	355.06	2	177.53	5.04	< .01
Trials	2221.78	1	2221.78	448.26	< .001
Groups x Trials	42.96	2	21.48	4.33	< .02
Error Groups	2607.11	74	35.23		
Error Within	366.78	74	4.96		

TABLE 2

Means and Standard Deviations of the Three Groups by Trials on the Paired-Associate Learning Task in the Effect of Corrective Feedback Study

		Trial 1		Trial 2	
Group	N	Mean	SD	Mean	SD
Feedback	28	8.36	4.03	15.68	4.72
No-Feedback	26	8.85	5.13	15.35	5.21
Control	23	4.30	2.82	13.35	4.38

for college students. The use of mediators would therefore facilitate the performance of the younger students, but not of the older ones. Or, perhaps the college students spontaneously used mediators and, therefore, did not benefit as much from this form of the training. These hypotheses are partially supported by the fact that the college level control group averaged more words recalled than the ninth-grade control group (9.35 versus 7.32) but the experimental groups were the same (10.07 versus 10.00).

Reading Comprehension. Analyses of the reading comprehension data indicated no significant differences between groups (see Table 4). This appeared to be primarily due to a ceiling effect. The maximum score on the tests for each of the two reading comprehension measures was 10. The mean performance for all groups was 8.7 on the first test and 9.1 on the second, with very little variability existing among the three groups. Although the pilot test results indicated that the reading materials were appropriate for this population, it is possible that the multiple-choice questions used were too easy. Later research conducted with SRA (1959) readings from the same levels, but with rewritten questions, has supported this interpretation.

In summary, it may be possible that the educational level of the students contributed to the lack of consistent differences on the learning tasks in this study. On a post-experimental questionnaire many of the students in the control group reported using their own fairly well-developed strategies in the learning situation, thereby diminishing the differences between the three conditions studied. Weinstein, Wicker, Cubberly, Roney, and Underwood (1980) also found that a high percentage of college students spontaneously use elaboration strategies to learn tasks similar to those used in the present study.

TABLE 3

Means and Standard Deviations for the Three Experimental Groups on the Free Recall Task in the Effect of Corrective Feedback Study

Group	N	Mean	SD
Feedback	28	10.07	3.30
No-Feedback	26	10.35	3.12
Control	23	9.35	2.04

TABLE 4

Means and Standard Deviations for Three Experimental Groups on the Two Reading Tasks in the Effect of Corrective Feedback Study

Group	N	Reading 1 (12th grade level) Mean	SD	Reading 2 (13th grade level) Mean	SD
Feedback	28	8.75	1.32	9.04	1.14
No-Feedback	26	8.62	1.24	9.27	1.04
Control	23	8.65	1.11	9.00	1.38

At the same time that the present study was performed another experiment was conducted that examined the relative effectiveness of training college students in the use of the method of loci, a cognitive mnemonic strategy, versus simply instructing students in its use. The method of loci was selected because it is a well documented memory aid with a fairly standardized set of instructions. Thus, one could anticipate that the instructions would be effective in improving performance. The question of interest was whether additional training in the use of this method would significantly improve performance above the level achieved by instruction only.

Training Versus Instruction: Method of Loci

The method of loci involves using the following processes to assist in recalling a list of items in a specified order. First, a series of loci or places are selected. These places can be around the home or neighborhood, or they can be along a commonly taken route. After memorizing these locations, the student learns and remembers lists of words by associating one word with each of the memory locations. This second part of the process is achieved by creating a clear, novel mental image that includes the memory location and the object or idea represented by the word. In this way, as the learner mentally moves through the locations he or she is able to recall the mental images and remember the words stored there.

It is now widely accepted that the method of loci is a very efficient mnemonic technique (Bower, 1970; Yates, 1966). Additionally, for this study, it was postulated that an elaborated version of this method involving the development of a story line including the loci would further assist recall, in spite of the additional memory burden this strategy might create. This story line was expected to aid recall by having each location

follow in a logical order related to the theme of the story created individually by each student. In summary, the purpose of the present study was to determine the relative effectiveness of training versus standard instruction in both elaborated and non-elaborated versions of the method of loci.

Method

Participants. The 100 students who participated in this study were drawn from several sections of an introductory educational psychology course at the University of Texas at Austin. Participation in research was part of the course requirement.

Materials. From the norms developed by Paivio et al. (1968), 120 words were divided into six lists of 20 words, with each list containing half high-concrete words (ratings in the range of 5.75 to 6.96) and half low-concrete words (ratings in the range of 1.73 to 3.88). In addition, the average meaningfulness values of the abstract words was matched to that of the concrete words on each list. These values ranged from 5.0 to 6.0 across lists.

Design and Procedure. The students were randomly divided into five groups of 20 students per group. All training and testing sessions were conducted in groups of four to seven individuals. In most studies involving the method of loci, the students are first given instructions in the use of the technique, then an opportunity to select their locations, then a practice word list, and finally a test to determine their level of mastery. For the standard (non-elaborated) instruction group, this instructional procedure was used. (A copy of these instructions is included in Appendix B.) After receiving this explanation of the purpose and processes involved in the method of loci the students were asked to select a

series of 20 memory locations, or loci, that they could use to remember a series of words. These loci had to be campus locations such as buildings, statues, offices, flagpoles, or other objects or places that they were familiar with on the university grounds. They were also reminded to make each location unique and distinct so that it would be easier for them to recall how to travel mentally from one location to the next in a logical and consistent order. Ten minutes were allowed for the students to create and memorize their list of locations.

After learning their loci the students practiced using the method with a list of 20 words. The words were presented at a 5-second rate on a Da-Lite screen using a Kodak slide projector with an automatic timing device. After studying the word list the students had 3 minutes in which to recall the 20 words in the order of presentation.

Upon completion of the practice list the posttest was administered. The students used their series of loci to recall two additional lists of 20 words. The procedure was the same as that used with the practice list. The words were presented at a 5-second rate and there was a 3-minute recall period.

Students in the elaborated instruction group followed the same procedure but received additional instructions directing them to use the elaboration strategy of developing a story line while practicing the method of loci. (A copy of these instructions can be found in Appendix C.)

The non-elaborated training group received a separate 1-hour practice session prior to the test session. During this additional session they received the standard instruction for using the method of loci, an opportunity to select locations on a route between their home and the campus, and three 20-word practice lists. Corrective feedback concerning their use of

the method was provided for each student after each practice list. One week later these students returned for the test session. The procedure used in the test session was the same as that for the instruction groups. However, since the students in the training group had already practiced using the method of loci, the discussion of the technique was treated as a review.

The elaborated training group went through the same procedure as the non-elaborated training group but received additional instructions directing them to use the strategy of developing a story line while practicing the method of loci. Finally, students in the control group did not receive any mnemonic instructions or practice but did take the posttest. They were instructed to use whatever strategy they thought would work best during the serial recall task.

Results and Discussion

A three way analysis of variance on the number of words correctly recalled (groups x concreteness x lists) with two within subject factors, concreteness and lists, revealed a significant main effect for groups, $F(4,95) = 9.48$, $p < .001$ (see Table 5). A Newman-Keuls post hoc analysis indicated that the training, elaborated training and elaborated instruction groups did not significantly differ, nor did the instruction and control groups. However, the two training groups and the elaborated instruction group were significantly different from the instruction and control groups. Therefore, training was shown to be somewhat more effective than standard instruction for teaching the method of loci. The finding that the instruction group did not perform significantly better than the control group is inconsistent with previous studies using the same procedures (Crovitz, 1969; Montague, 1972; Norman, 1976; Ross & Lawrence, 1968).

TABLE 5

Source Table for Analysis of Variance of Scores on the Serial Learning Task in the Training Versus Instruction: Method of Loci Study

Source	SS	df	MS	F	p
Groups	474.86	4	118.72	9.48	< .001
Concreteness	46.24	1	46.24	27.21	< .001
Lists	19.36	1	19.36	8.91	< .01
Groups x Concreteness	9.81	4	2.45	1.44	N.S.
Groups x Lists	11.69	4	2.92	1.34	N.S.
Concreteness x Lists	1.96	1	1.96	1.39	N.S.
Groups x Concreteness x Lists	27.64	4	6.91	4.90	< .01
Error Groups	1189.80	95	12.52		
Error Concreteness	161.45	95	1.70		
Error Lists	206.45	95	2.17		
Error Within	133.90	95	1.41		

The addition of a story line did not appear to affect performance when the elaborated training group was compared to the training group, but did appear to increase performance when the elaborated instruction group was compared to the group receiving instruction only. In a 2 x 2 analysis of variance (training x elaboration) on the total scores over both lists, the interaction was significant, $F(1,96) = 5.43$, $p < .05$ (see Tables 6 and 7). It appears that either training (including practice) or elaborated instruction (through the addition of a story line) will significantly improve performance with the method of loci when compared to simple instruction only. However, these effects may not be additive--the elaborated training group's performance was not significantly different from either the training or elaborated instruction groups.

The significant main effect of concreteness, $F(1,95) = 27.21$, $p < .001$, was expected because high-concrete words tend to be recalled better than low-concrete words. Also, as expected, the scores on List 2 were higher than on List 1, $F(1,95) = 8.91$, $p < .01$. None of the two-way interactions were significant.

The three-way interaction of groups, concreteness, and lists was also significant, $F(4,95) = 4.90$, $p < .01$. This interaction effect seems to be primarily the result of differential practice effects on the instruction and control groups' performance with high- and low-concrete words (Figure 1).

In summary, there is some evidence that training, with practice, or elaboration through the addition of a story line can significantly improve the effectiveness of the method of loci. Further research is needed to determine the optimal techniques for training students to use this type of strategy.

TABLE 6

Source Table for Analysis of Variance of Total Scores on the Serial Learning Task in the Training Versus Instruction: Method of Loci Study

Source	SS	df	MS	F	p
Training	1322.52	1	1322.52	26.59	< .001
Elaboration	115.89	1	115.89	2.33	N.S.
Training x Elaboration	270.09	1	270.09	5.43	< .05
Error Within	4774.83	96	49.74		

Table 7

Means and Standard Deviations for Scores on Two Trials of the Serial Learning Task in the Training Versus Instruction: Method of Loci Study

		Trial 1		Trial 2	
Group	N	Mean	SD	Mean	SD
Training	20	16.50	3.35	16.65	2.70
Elaborated Training	20	15.50	2.80	15.95	2.98
Elaborated Instruction	20	13.50	4.48	14.35	4.72
Instruction	20	11.25	5.28	12.05	5.11
Control	20	9.95	2.67	12.10	2.88

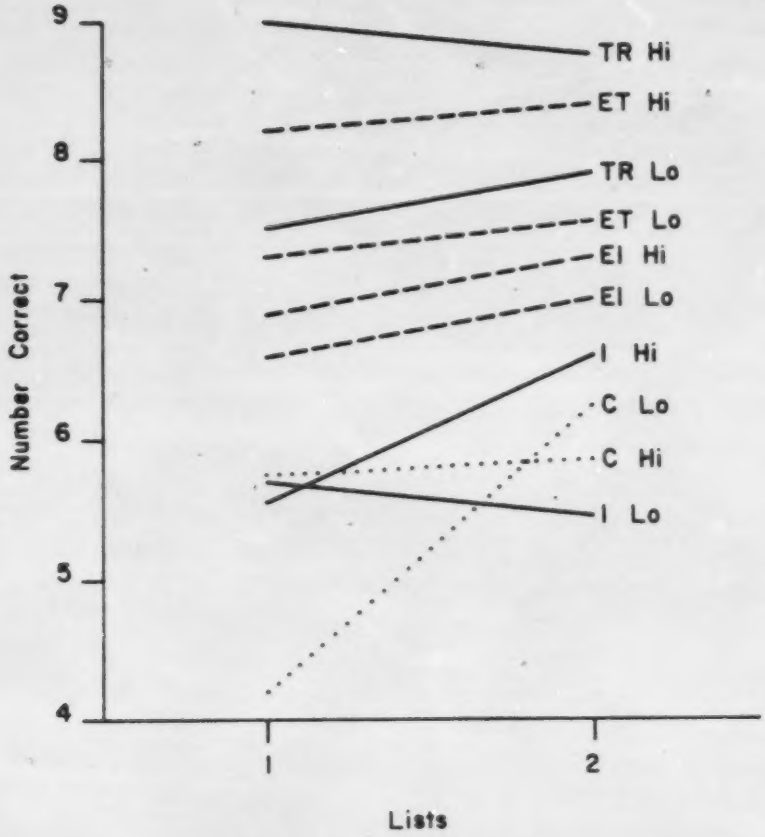

Figure 1. Interaction of groups, concreteness, and lists in the Training versus Instruction: Method of Loci study for training and instruction alone (——), story elaboration (---), and control (···). (TR = training, ET = elaborated training, I = instruction, EI = elaborated instruction, C = control; Hi and Lo refer to concreteness ratings of words).

Training Versus Instruction: Cognitive Learning Strategies

Since the provision of training appeared to be an important variable in teaching students to use the method of loci another study was conducted to see if training was equally important for other, more general, cognitive learning strategies. Three general strategies were selected--imagery, verbal elaboration, and grouping.

The cluster of strategies involving imagery calls for the formation of a mental picture by the learner of the person, events, or information to be learned. Verbal elaboration, as used here, involves enhancing the meaningfulness of to-be-learned material by relating it to the learner's current cognitive structure. For example, as a student or trainee reads through a passage he or she might ask and answer such questions as, "What is the purpose of this material?" or, "How does this relate to my knowledge, experience, beliefs, and attitudes?" or, "What are the logical relationships in the material?" or other similar questions which are designed to involve the learner in actively relating to the new information. Grouping, as used in this research, is actually a combination of strategies whereby the learner first clusters information according to meaningful relationships by putting similar materials together and then uses imagery, sentence formation, or other forms of elaboration to learn the elements in each cluster.

The purpose of this study was to investigate the effects on student performance of a more extensive, long-form of instruction compared to a less extensive, short-form of instruction.

Method

Participants. The 36 participants who volunteered for this study were

college students enrolled in freshman English classes at the University of Texas at Austin. Two intact classes of 18 students each were used. One class was randomly chosen to be the instruction group, and the other the training group. Previous scores provided by the instructor indicated that these two groups were equivalent on various performance and departmental reading measures.

Materials. This study compared training methods using either short or long versions of instructions concerning the use of cognitive strategies for learning from written materials. The written materials consisted of short passages taken from the SRA (1959) materials corresponding to ninth- and fourteenth-grade reading levels. The ninth-grade-level passages were each about 225 words long, dealt with fairly concrete topics, were relatively unsophisticated in content, and consisted of commonly used words. The fourteenth-grade-level passages were each about 400 words long, dealt with more abstract topics, were relatively sophisticated in content, and used a higher vocabulary level than the ninth-grade readings. For this study then, the ninth-grade readings were considered to be relatively easy and the fourteenth-grade readings relatively difficult.

Two passages were selected for the training portion of this study. The first passage presented was an easy one dealing with the physical requirements necessary for space travel. The second passage, a difficult reading, dealt with IQ.

The training materials for the two groups differed only in the length and elaboration of the instructions for using the cognitive strategies. Both sets of instructions were in written form and were designed to be read by the students themselves.

The elaborated, long form of the instructions consisted of explanations

of the strategies, numerous examples of their use, and provisions for practice in using them. In addition, verbal feedback was given by the experimenter. A sample passage was used to familiarize the students with the cognitive strategies to be learned. The sample passage was taken from George Kneller's Foundations of Education (1971). In this portion of Kneller's work he challenges a number of fundamental issues in current American educational practice. This passage was selected to tap the students' interest in education and to foster their interest in the training program. The results of a pilot test indicated that this passage was effective in achieving these goals. (A copy of the experimenter's directions and a student packet may be found in Appendices D and E.)

The short form of the instructions contained the same explanation of the strategies as did the elaborated, long form. However, the descriptions and examples were less detailed and fewer in number. (A copy of this student packet can be found in Appendix F.) Furthermore, in this condition, the experimenter did not elicit and discuss student-generated examples of the strategies.

The testing materials consisted of two passages, one easy reading dealing with child prodigies and one difficult reading concerning the conflict between good and evil. The tests on these two readings were composed of 10 open-ended questions and 10 multiple-choice questions.

Previous use of the SRA questions in this type of study using college students had resulted in a ceiling effect. In an attempt to avoid a ceiling effect in this study and to achieve a sufficiently wide range of scores, many of the original multiple-choice items were rewritten by the experimenters and then pilot tested to assure that they met the criteria described above. The open-ended questions were also pilot tested using the same

criteria. Both multiple-choice and open-ended questions were used in testing the effectiveness of the training variables in order to see if there were any differences between the two groups in terms of recall (open-ended questions) versus recognition (multiple-choice questions).

Design and Procedure. The training group participated in two 50-minute sessions. In the first session this group received the more extensive form of the instructions. This consisted of a description and explanation of each of the strategies and provisions for the experimenter to give feedback to the students concerning their level of mastery. The three strategies--imagery, verbal elaboration, and grouping--were introduced and demonstrated one at a time using the sample passage from Kneller (1971). After the introduction of each new strategy, the students were instructed to practice this strategy on a portion of the sample passage. The students gave examples of their application of the strategy and received feedback from the experimenter as to the appropriateness of their examples. During the last part of the first session the students were given two practice readings, one easy and one difficult. These materials were used to practice applying the strategies, as well as to receive additional feedback from the experimenter.

During the second session, the students were given a review of the strategy descriptions. Immediately following this review they were given 3 minutes in which to study an easy reading. Students were then administered a posttest composed of 10 open-ended and 10 multiple-choice questions. Six minutes were allotted for the open-ended questions and 3 minutes for the multiple-choice questions. This procedure was then repeated with a difficult reading, except that 5 minutes were allotted for study, 6 minutes for the open-ended test, and 4 minutes for the multiple-choice test.

The instruction group had only one session, which was the same as the second session for the training group. They received an explanation of the three strategies and examples of their use, but did not practice using the strategies or receive feedback from the experimenter concerning their level of mastery. They were tested on the same easy and difficult readings as the training group.

Results and Discussion

A three way analysis of variance (groups x reading difficulty x type of question) indicated that training in the use of cognitive learning strategies significantly improved performance on the learning tasks as compared to instruction only, $F(1,34) = 4.31$, $p < .05$ (Table 8). As expected, scores were higher on the easy versus difficult readings, $F(1,34) = 70.16$, $p < .001$, and also higher on the multiple-choice than on the open-ended questions, $F(1,34) = 12.39$, $p < .01$.

A significant interaction effect between reading difficulty and type of question was found, $F(1,34) = 12.20$, $p < .01$, which indicated that the difference between multiple-choice and open-ended test scores was greater on the easy than on the difficult reading. The three-way interaction was also significant, $F(1,34) = 7.70$, $p < .01$. The training group had only slightly superior scores on both tests over the difficult reading and the multiple-choice test over the easy reading. However, on the open-ended test over the easy reading, the training group scored significantly higher than the instruction group (Figure 2). Open-ended test questions are generally considered more difficult than multiple-choice, since open-ended questions require recall of the correct response, but multiple-choice questions only require the learner to recognize the correct response from among several alternatives. It appears that training when compared

TABLE 8

Source Table for Analysis of Variance of Reading Task Scores in the Training Versus Instruction: Cognitive Learning Strategies Study

Source	SS	df	MS	F	p
Groups	26.27	1	26.27	4.31	< .05
Reading Difficulty	216.34	1	216.34	70.16	< .001
Question Type	36.50	1	36.50	12.39	< .01
Groups x Reading Difficulty	5.64	1	5.64	1.83	N.S.
Groups x Question Type	6.89	1	6.89	2.34	N.S.
Reading Difficulty x Question Type	19.88	1	19.88	12.20	< .01
Groups x Reading Difficulty x Question Type	12.54	1	12.54	7.70	< .01
Error Groups	207.28	34	6.10		
Error Reading Difficulty	104.84	34	3.08		
Error Question Type	100.17	34	2.95		
Error Within	55.39	34	1.63		

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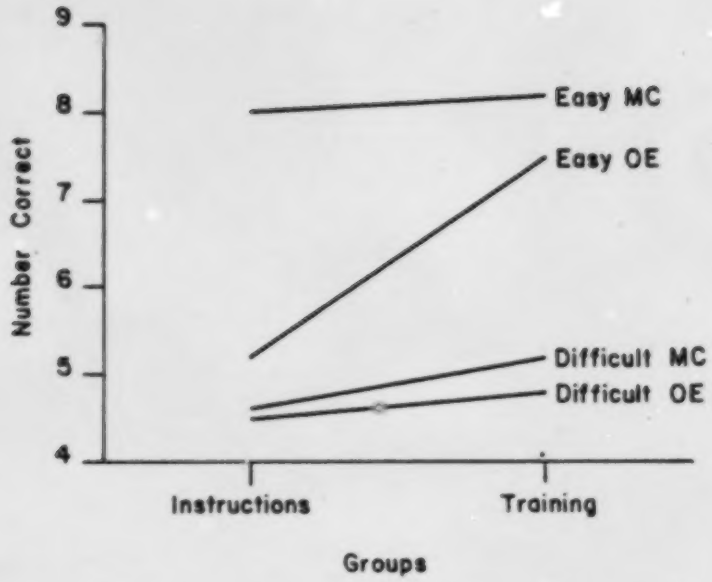

Figure 2. Interaction of groups, reading difficulty, and type of questions in the Training Versus Instruction: Cognitive Learning Strategies study (MC = multiple-choice, OE = open-ended).

to instruction in the use of cognitive strategies may improve recall of information from prose, but training and instruction do not differentially affect recognition.

The failure to find differences between groups on the difficult reading may be due to a floor effect, as indicated by the low scores of both groups on the tests over the difficult reading (Table 9). It was expected that the fourteenth-grade-level reading passage (equivalent to a college sophomore level) would be difficult for these freshmen students. For this reason, more time was allotted for reading and answering the questions over the difficult passage than for the easy passage. However, the additional time allotted may not have been sufficient for the students to effectively apply the strategies to learn the difficult reading materials.

An alternate hypothesis is that the amount of training provided may not have been sufficient for the strategies to be learned thoroughly enough to be used by the students on the difficult reading. This is supported by the results for the tests over the easy reading. On the multiple-choice questions, which only require recognition of the correct alternative and therefore may not demand extensive or sophisticated uses of verbal elaboration, grouping, and imagery, the scores of the training and instruction groups were very similar. However, on the open-ended questions, which required the learner to recall the information, the training group performed significantly better. It may be that the feedback and extra practice provided for the training group resulted in more sophisticated and effective use of the cognitive strategies which was apparent only with these questions. If this were the case, even more extensive training than that received by this group might be necessary for effective use of cognitive strategies with difficult reading materials. However, further research is necessary

TABLE 9

Means and Standard Deviations for Instruction and Training Groups on the Reading Comprehension Tests in the Training Versus Instruction: Cognitive Learning Strategies Study

Reading	Test	Group	N	Mean	SD
Easy (9th grade level)	Multiple-Choice	Instruction	18	8.00	1.65
		Training	18	8.22	1.44
	Open-Ended	Instruction	18	5.22	2.00
		Training	18	7.50	1.45
	Total	Instruction	18	13.22	3.11
		Training	18	15.72	1.98
Difficult (14th grade level)	Multiple-Choice	Instruction	18	4.61	2.09
		Training	18	5.22	2.18
	Open-Ended	Instruction	18	4.50	2.14
		Training	18	4.81	1.72
	Total	Instruction	18	9.11	3.75
		Training	18	10.03	3.02

to determine whether additional training will increase performance with difficult materials.

The results of this study partially support the effectiveness of training with feedback in the use of cognitive learning strategies. However, the amount of training necessary to optimize learning appears to be dependent upon several factors, such as the difficulty level of the materials with which the strategies will be used, and the types of tests used to assess what has been learned. More extensive training may be necessary for more difficult materials and/or tests which require recall rather than recognition of the material.

Future Directions

The research and development effort described in this report will continue as part of the Cognitive Learning Strategies Project at the University of Texas at Austin. The goals of this project are to refine our understanding of the covert processes involved in utilizing cognitive strategies for learning and retention, and to design, develop and field test training programs to modify learner's information processing strategies. As we increase our understanding of cognitive learning strategies that contribute to effective and efficient learning we will be able to provide heuristic means for the individual learner to use in identifying, monitoring, modifying, and implementing a plan for achieving instructional goals.

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APPENDIX A

Directions and Task Materials for Feedback and No-Feedback Groups in the Effect of Corrective Feedback Study

This is a study about how people learn. It is not an intelligence or personality test. No deception is involved.

You will meet at the same time and place for four consecutive weeks. You need to come to each of these sessions to receive credit. During each session you will be given several readings and approximately ten minutes to study each one.

During this time we want you to develop learning aids to help you remember the reading material. Suggestions will be included with the readings. We are interested in both the quality and variety of learning aids you develop. Please write down all of your ideas, even if they seem silly to you. Strange or funny study aids are fine, as long as they help make the material more meaningful to you. This is a very individualistic process. We want to know what works for you. What makes the material more meaningful for you.

We will then ask you a question about the reading material.

All of your work will be kept strictly confidential, being available only to persons working with Dr. Weinstein's project.

The success of this study depends on your confidentiality. Please do not discuss your work with your classmates until after the four weeks are over. At the completion of the study, your entire class will receive information about the study.

Thank you.

Training Instructions

Instructions for Reading 1

I want you to learn the information contained in the following paragraph and, most important, I want you to develop learning aids to study this information. You must learn to distinguish between the veins and the arteries. For example, the veins are thinner than the arteries. To help you remember this fact you might try to form a picture in your mind of a thin hollow tube when you think of a vein. Or you might make up a sentence or story which would associate a vein with a thin tube such as the vain woman was thin as a rubber tube. Although the word vain in this sentence is not the same as the word vein meaning a structure in the body, it could still help you to learn this property of veins.

Concentrating on pictures or images we form in our mind can be a powerful aid to our memory. So can forming sentences or little stories which help us to remember information we must learn. These are both different ways of trying to make new or unfamiliar material more meaningful to us so that it will be easier to learn.

You can also try to relate the information contained in the reading to something else you already know. Then try to figure out as many ways as you can that the two are related or similar. For example, a vein is like a thin rubber water pipe. Both are thin tubes, relatively rigid and have fluid going through them.

I would like each of you to read this passage carefully and try to create some learning aids that you think will help you to learn the different properties of arteries and veins.

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we

have an idea of what you did.

How do the Arteries Differ from the Veins?

Arteries and veins are both hollow tubes through which the blood flows. The two differ, however, in three important respects. The work of an artery, first of all, is to carry blood rich in oxygen from the heart to the various organs of the body. The work of a vein, on the other hand, is to return to the heart blood laden with carbon dioxide. In structure, too, veins and arteries differ markedly. Although the walls of both are composed of three coats of tissue, the veins are thinner than the arteries and less elastic. A third point of difference is the way the blood moves within the two types of vessels. Propelled by the force of the heartbeat, the blood rushes through the arteries, which expand and contract to push it forward in spurts. In the veins, however, the blood flows slowly and smoothly.

Source: Tressler and Christ (1960)

Reading 1 Postquestion. How do the arteries differ from the veins?

Instructions for Reading 2

The following is a shopping list for a home economics class. Imagine you are in the class and you must remember this list when you get to the grocery store. Assuming you cannot take the list with you, how could you remember it? The order is not important, but you must remember all of the items.

In learning a list of items it is helpful for a student to have some way of associating all of the items in the list. One way to do this is to create a little scene or story that would include each of the items. For example, to remember a list of school supplies such as pencil, paper and

textbook, you might imagine a student reading a textbook and using her pencil to take notes. Remembering the image or story would help you to remember the articles on the list. Making up a story is one way to help someone learn this list. See how many different learning aids you can create that would help you. Remember, you do not have to remember the items in order, but you must remember all of them.

Also notice that for different materials some types of aids are better than others. Try to come up with stories or images that would help you to connect all the words so that if you forget one of them the logic or theme of the story could help you to remember it.

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

Home Economics Shopping List

crackers

tomatoes

chicken

pickles

soup

lettuce

tea

mustard

ice

bread

salt

Reading 2 Postquestion. Write down as many of the words from the shopping list as you can remember.

Instructions for Reading 3

Peter wants you to remember the following phone numbers of his friends. What can you do to help yourself memorize them? One way to memorize a phone number is to look for patterns or relationships among the numbers and/or make up a little story. For example, Joe has a 4-year-old sister. Four and three are seven. Seven plus two equals nine, take away one equals eight with one left over. Joe's phone number is 437-2981.

What could you suggest to help yourself learn these phone numbers? Try to look for patterns or relationships which you can use to make these strings of numbers more meaningful to you.

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

Phone Numbers

Joe 437-2981
Kathy 678-4252
Jim 371-2874
Susan 471-1044
Gary 352-9866

Reading 3 Postquestion. Write down the phone numbers of the following people--Gary, Kathy, Joe, Susan, and Jim.

Instructions for Reading 4

All driver education students must learn the meanings of the different

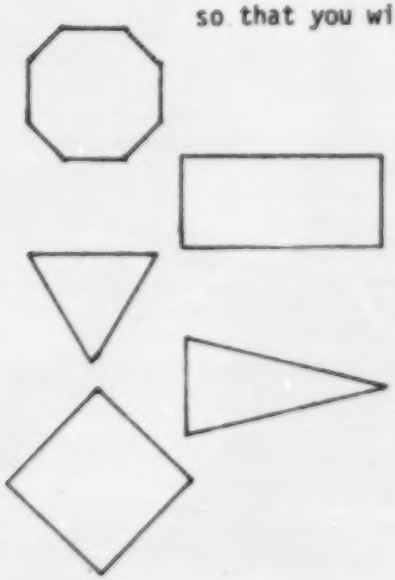
shapes used for road signs. I would like each of you to try to create learning aids that would assist a student in relating the following sign shapes to their meanings. For example, a sign with a round shape warns the driver that there are railroad tracks up ahead. A student trying to learn this might concentrate on associating the round sign with the round wheels of a train. He could make up a sentence like "the wheels of a train go round and round" or he could concentrate on an image of round train wheels when he looks at the sign shape.

To help you learn the meanings of the different shapes, I would like each of you to try to devise ways of relating these sign shapes to their meaning. Remember the examples we have discussed before using images, phrases, sentences, and stories.

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

KNOW THESE SIGNS BY THEIR SHAPES

so that you will know what to do at a distance



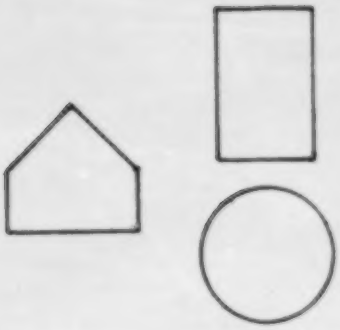
OCTAGON:
Exclusively for stop signs.

HORIZONTAL RECTANGLE:
Generally for guide signs.

EQUILATERAL TRIANGLE:
Exclusively for yield signs.

PENNANT:
Advance warning for no passing zones.

DIAMOND:
Exclusively to warn of existing or possible hazards on roadways or adjacent areas.



VERTICLE RECTANGLE:
Generally for regulatory signs.

PENTAGON:
School advance and school crossing signs.

ROUND:
Railroad advance warning signs.

Reading 4 Postquestion. Please write the meaning of the following shapes.

Instructions for Reading 5

Whenever we read about a specific person or idea it is helpful to compare the specific example we are given to the more general case. For instance, a story about Helen Keller's courageous life could be made more meaningful by considering the properties of courage in general and what they imply about a person. On the basis of this information in the following reading about Sam Houston, try to relate it in as many ways as possible to what you think about "human nature" in general. Use these aids to help you learn the information contained in the passage.

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

Sam Houston was fiercely ambitious, yet at the end he sacrificed for principle all he had ever won or wanted. He was a Southerner, and yet he steadfastly maintained his loyalty to the Union. He was a slaveholder who defended the right of Northern ministers to petition Congress against slavery; he was a notorious drinker who took the vow of temperance; he was an adopted son of the Cherokee Indians who won his first military honors fighting the Creeks; he was a Governor of Tennessee but a Senator from Texas. He was in turn magnanimous yet vindictive, affectionate yet cruel, eccentric yet self-conscious, faithful yet opportunistic.

--John F. Kennedy, Profiles in Courage

Source: Pollock, Sheridan, and Williams (1969)

Reading 5 Postquestion. Write a summary of this passage about Sam Houston.

Instructions for Reading 6

Imagine that you must learn the names of the following relations of the household cat. You do not have to remember the names in order but you must be able to recall them all. Try to come up with as many ways as you can to make this list easier for you to learn.

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

The relations of a household cat include the following wild animals:

lion
tiger
ounce
leopard

jaguar
ocelot
cheetah
lynx
mountain lion

Reading 6 Postquestion. Write down the names of the relations of the household cat in any order.

Instructions for Reading 7

A student interested in retail business must know something about salesmanship. The following reading discusses five steps necessary to make a sale. A list of things to remember can be made more meaningful by relating them to other things we know through a story or set of logical connectors. For example, the procedure for proper dishwashing is to wash the dishes first, and then the glasses, silver and pots. You might imagine someone trying to wash a dish in a sink full of soapy water. While he was scrubbing the dish his glasses fell into the water. In an attempt to find his glasses our washer uses a fork to try to scoop them out. When this fails he uses one of the pots to scoop out the water so he can find his lost articles. This story may sound silly to you but remembering it could help to recall the procedure for proper dishwashing.

See how many learning aids you could devise to help yourself learn the rules of salesmanship in proper order.

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

Five Steps to a Sale

There are five steps through which the salesman must lead the prospective customer in making a sale: (1) gaining attention, (2) arousing interest, (3) building desire, (4) winning conviction, and (5) getting action.

1. Gaining attention. It is obvious that you cannot begin selling until you have the attention of your prospect. The door-to-door salesman appreciates this fact most, since in many cases he cannot finish his opening sentence before the door closes! Attention is gained when a prospective customer is aware that he needs something. The prospect's attention may have already been drawn to the product through an advertisement while the prospect was leisurely reading a magazine, watching a television program, or listening to the radio. Often, however, the salesman must win attention; and he can do so by using a prompt approach, giving a friendly introduction, or having a courteous and businesslike manner. Or he can win attention by doing or saying something unusual.

2. Arousing interest. Interest is aroused by getting the prospect to appreciate fully his need for the product. This step in the sales process, like gaining attention, may have taken place already in the prospect's home or at some time before he has even seen a salesman. If not, it will be necessary for the salesman to arouse the prospect's interest. To accomplish this, the salesman may need to try several different approaches.

For example, if the safety features and smart styling of an electric range are being demonstrated and the prospect seems obviously unmoved, the salesman has failed as yet to arouse interest. At this point, he might mention the automatic controls that turn off the heat at a designated time, leaving the customer free to go shopping while the dinner is cooking;

or he might mention the even-temperature cooking that lessens the danger of scorching food (a feature he knows many older stoves lack). He watches for signs of interest and proceeds from one feature to another until he is sure he has that interest.

3. Building desire. The salesman must build a desire for the prospect to own the product before he can hope to make a sale. The desire may be built by stressing such qualities as beauty, timesaving features, smartness of design, durability, or economy. The prospect must want to own the product or he will not buy it no matter how much he may be interested in what the salesman tells him about it. If a man has become interested in a salesman's presentation of a riding-type power lawn mower, he will purchase itonly if the salesman can pinpoint the features that will make him want to own it. It may be the laborsaving features, the fact that his neighbor has one, or merely an interest in mechanical things.

4. Winning conviction. The prospect may have a desire to own the product, but often he still needs to be convinced that yours will fit his needs best. At the "conviction stage" the salesman must be prepared to back up his statements with facts--facts about the advantages claimed for the product, how it measures up to other products, why it is a smart buy, how easy it is to own, and so on. This is where the salesman emphasizes the features that aroused the prospect's desire in the first place.

5. Getting action. Even though the prospect may be convinced that a product will suit him perfectly and he has the desire to own it, he still may not act. The salesman must help him make the decision to buy. He may say, "Shall I have it wrapped for you?" or "We can deliver this tomorrow morning," or "What color did you decide on?"

The sales process may be considered as a series of links in a chain, each link representing a sales proposition. These links should be put together so smoothly that neither the prospect nor the salesman is aware that they have been separate parts.

Source: Ernest and DeVall (1965)

Reading 7 Postquestion. Please write the rules of salesmanship in proper order.

Instructions for Reading 8

Sometimes it is difficult to remember the capital city of a state. What could you do to help yourself learn the capitals of the following eight states? For example, you might try to picture Columbus sailing his ship down the Ohio River by mistake or make up a brief story about the Cheyenne Indians attacking Wyoming. Anything which makes the connection between the states and its capital more meaningful is fine. See how many aids you can create to help you learn this list.

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

States and Their Capitals

Wyoming -- Cheyenne
Connecticut -- Hartford
Maine -- Augusta
South Dakota -- Pierre
Pennsylvania -- Harrisburg
Idaho -- Boise
Nevada -- Carson City
Ohio -- Columbus

Reading 8 Postquestion. Write down the capitals of the following states:

Wyoming
Connecticut
Maine
South Dakota
Pennsylvania
Idaho
Nevada
Ohio

Instructions for Reading 9

On the basis of the information in the following paragraph try to imagine possible future uses of the helicopter and how they will affect our lives. Use these aids to try to learn the information contained in this passage.

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

Helicopters

Ever since Daedalus and Icarus tried out their homemade feather wings, men have dreamed of personal flying machines that would take them anywhere they wanted, any time. Only in the twentieth century, however, have aircraft been developed that can rise vertically from a doorstep and land comfortably and safely in a back yard. Called "helicopters," these machines look like airplanes without wings. Instead of wings the helicopter has one or two overhead rotors, each consisting of three or four long, flat blades that lift the craft into the air and enable it to fly forward, backward, and sideways or to hover in one spot.

The lightweight gasoline engines of the twentieth century made possible the first practical helicopters. In 1907 Louis Breguet and Charles Richet built a twin-rotor helicopter that got off the ground but crashed. Although he began experimenting in 1909, Igor Sikorsky, one of the leading helicopter designers, did not build a successful model until 1939.

Since World War II, when helicopters first proved themselves, uses of the fragile "whirlybird" have multiplied. In big cities like New York and Los Angeles, the post office uses helicopters to distribute mail over highway traffic jams and for shuttle service from airports to the city. In some cities helicopters are used as ambulances. In others the police department uses them for rescue work and traffic control.

Source: Tressler and Christ (1960).

Reading 9 Postquestion. Write a brief summary of this passage about helicopters.

Instructions for Reading 10

How could you explain the following poem by relating it to either yourself or someone you know?

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

Get Up, Blues

Blues
Never climb a hill
Or sit on a roof
In starlight.

Blues
Just bend low
And moan in the street
And shake a borrowed cup.

Blues
Just sit around
Sipping,
Hatching yesterdays.

Get up, Blues
Fly.
Learn what it means
To be up high.

James A. Emanuel

Reading 10 Postquestion. Write a brief summary and interpretation of this poem.

Instructions for Reading 11

One effective way to learn historical information is to relate it to current events. How does the following reading relate to the current problems of the world's democracies? Do not just say that things are the same or different, but say how they compare and give some details.

Please write your ideas down on the paper provided. You do not have

to describe your aids in detail, but please write down enough so that we have an idea of what you did.

Democracy Faced New Trials in Europe

In 1919 men indeed believed that the Great War had been fought "to make the world safe for democracy." The map of Europe was transformed as old empires were carved up to establish new democratic states. Many people had their first opportunity to live under governments of their own choosing. But in the new democracies, serious political and economic problems--coupled with the lack of experience in democratic methods--threatened the growth of stable governments. The old democracies, such as Britain and France, faced crucial issues also, but their representative systems of government were deeply rooted and the people were accustomed to solving problems by democratic methods.

Source: Walter and Schrier (1969)

Reading 11 Postquestion. Write a brief summary of the reading about democracy in Europe.

Instructions for Reading 12

How could you help yourself to remember which state each of the following famous Americans represented when he signed the Declaration of Independence?

Please write your ideas down on the paper provided. You do not have to describe your aids in detail, but please write down enough so that we have an idea of what you did.

Signers of the Declaration of Independence

John Penn--North Carolina
Samuel Chase--Maryland
Thomas Jefferson--Virginia
Benjamin Franklin--Pennsylvania
Lewis Morris-New York
Josiah Bartlett--New Hampshire
Caesar Rodney--Delaware
John Hancock--Massachusetts
Lyman Hall-Georgia
John Witherspoon--New Jersey
Roger Sherman--Connecticut
Stephen Hopkins--Rhode Island
Edward Rutledge--South Carolina

Reading 12 Postquestion. Write down the names of the state which each of the following individuals represented when he signed the Declaration of Independence.

John Hancock
Edward Rutledge
John Penn
Lewis Morris
Benjamin Franklin
Thomas Jefferson
Samuel Chase
Lyman Hall
Stephen Hopkins
Caesar Rodney
Josiah Bartlett
Roger Sherman
John Witherspoon

APPENDIX B

Standard Instructions for the Training Versus Instructions:

Method of Loci Study

For thousands of years man has attempted to find ways of improving his memory in different learning situations. Today I would like to help you learn one of the specific and successful methods we now know can help you to improve your memory. This technique is called the method of loci.

Basically, this technique involves two processes. First, you must select a series of loci, or places. These places can be locations around your home, your neighborhood, a building, a street or a route you commonly take. After you have memorized these locations you can learn and remember any list of words by associating one word with each of your memory locations. This second part of the process is done by creating a clear and novel mental image, or picture in your head, of the objects or idea represented by each word. This image must include the location you are using to store the word. In this way when you mentally move through your locations you will be able to recall your mental images and retrieve, or remember, the word you stored there.

For example, let us say that someone had selected locations such as: my street, my driveway, my front door, and my refrigerator. These locations would be easy to remember because they are familiar and easy to order. If this person wanted to use these loci to memorize a grocery shopping list such as hot dogs, tomatoes, bananas, and tuna fish, they would try to imagine vivid mental pictures of the items at the respective loci. For example, they could picture huge hot dogs blocking the street, rotten tomatoes splattered all over the driveway, a front door shaped like a banana, and a thrashing tuna lying in the refrigerator. Now when the

person wants to remember the shopping list it is just a matter of mentally walking through the list of familiar locations and asking--"What did I put in the street? the driveway? the front door? the refrigerator?" and so on.

Sometimes the words we have to learn represent more abstract ideas rather than specific objects. You can still use the method of loci to help you remember these words. This can be accomplished by representing each abstract word with a concrete example. For instance, if you had to learn the list: movement, education, caution, and reading, you might first imagine a lot of heavy traffic moving quickly on the street (movement), a class meeting in a driveway (education), a blinking yellow light on your front door (caution), and someone sitting in your refrigerator reading a book (reading).

To summarize, in order to memorize a series of items, first memorize a series of mental pictures of locations arranged in a familiar order. It is important that each location be unique and separate and that all of the locations follow a familiar or natural order for you. Then make up a vivid mental image representing, suggesting, or symbolizing each item of information, or word, that is to be remembered. These images may be elaborated in as much detail as you want. You can use color, unusual sizes or shapes, humorous conditions, or anything else that will help to make the images memorable or easy to recall. As you create these images associate them one by one with one of your memory locations. Mentally picture your image of the item placed in the context of your memory location. Concentrate on your image of the item as it appears in your location.

Now, when you want to recall the scene constructed at each memory

location you need only take a mental walk through your list of loci and ask yourself what is stored at each one. Recalling the scene will help you to remember the item stored there. Moving from location to location will help you to remember the order of the items.

APPENDIX C

Elaborated Instructions for the Training Versus Instruction: Method of Loci Study

For thousands of years man has attempted to find ways of improving his memory for different learning situations. Today I would like to help you learn one of the specific and successful methods we now know can help you to improve your memory. This technique is called the method of loci.

Basically, this technique involves these processes. First, you must select a series of loci, or places. These places can be locations around your home, your neighborhood, a building, a street, or a route you commonly take. After you have memorized these locations you can learn and remember any list of words by associating one word with each of your memory locations. This second part of the process is done by creating a clear and novel mental image, or picture in your head, of the object or idea represented by each word. This image must include the location you are using to store the word. In this way when you mentally move through your locations you will be able to recall your mental images and retrieve, or remember, the word you stored there. Finally, create a story which moves you from one location to the next.

For example, let us say that someone had selected locations such as: my street, my driveway, my front door, and my refrigerator. These locations would be easy to remember because they are familiar and easy to order. It is fairly common to go home and get a cool drink. If this person now wanted to use these loci to memorize a grocery shopping list such as hot dogs, tomatoes, bananas, and tuna fish, they would try to imagine vivid mental pictures of the items at their respective loci. For example, you could picture yourself coming home and riding over huge hot dogs that were

blocking your street. Then as you turned into the driveway someone started to throw tomatoes at you! As you are reaching for the front door knob you slip on a banana peel. Once inside you go to get a cool drink from the refrigerator but when you go toward your refrigerator you find that it has been eaten by a giant tuna!

Some of these may sound silly, but...what counts is that they work.

Sometimes the words we have to learn represent more abstract ideas rather than specific objects. You can still use the method of loci to help you remember these words. This can be accomplished by representing each abstract word with a concrete example. For instance, if you had to learn the list: movement, education, caution, and reading, you might first imagine a lot of heavy traffic moving on your street and making it difficult for you to get home (movement). When you finally come to your driveway it is blocked by a class meeting there (education). As you open your front door you see a blinking yellow light warning you not to enter the kitchen (caution). However, you are thirsty so you enter the kitchen and discover that someone is sitting in your refrigerator reading a book (reading).

To summarize, in order to memorize a series of items, first memorize a series of mental pictures of locations arranged in a familiar order. It is important that each location be unique and separate and that all of the locations follow a familiar or natural order for you. Then make up a vivid mental image representing, suggesting, or symbolizing each item of information, or word, that is to be remembered. These images may be elaborated in as much detail as you want. You can use color, unusual sizes or shapes, humorous conditions, or anything else that will help to make them memorable

or easy to recall. As you create these images, associate them one by one with one of your memory locations. Mentally picture your image of the item placed in the context of the memory location. Concentrate on your image of the item as it appears in your location. Also create a story to move you from one location to the next.

Now, when you want to recall the scene constructed at each memory location, you need only take a mental walk through your list of loci and ask yourself what is stored at each one. Recalling the scene will help you to remember the item stored there. Moving from location to location will help you to remember the order of the items.

Involving yourself in each scene or creating some other story line will help you to recall the items in their proper order. It will also make scenes more interesting and easier to recall.

APPENDIX D

Experimenter Directions for the Group Receiving Elaborated Instructions in the Training Versus Instruction: Cognitive Learning Strategies Study

Hi, thank you for coming today. My name is _____. I'm interested in developing better learning methods. During the next two hours you will read about several methods that are helpful for certain kinds of learning. You will have a chance to practice these methods or learning strategies during the first part of the period. Then during the last part of the period I will test you to see how well you learned to use them. This is not an intelligence test. You, the student, are not being tested. Instead, we will test the effectiveness of the learning strategies that you are going to learn. Obviously, the better you learn the strategies, the more we can find out about them when we test. So, even though you may find these learning methods new, try to master them as well as you can during the practice session.

Are there any questions?

Training Instructions

Now I'm going to ask you to look at this booklet, studying it one section at a time. You will have 9 minutes to read each section, so please take your time and try to learn these methods. You will also find that they are very helpful for your school work as well as this study.

If at any time you are confused about what you should be doing or need some help, just raise your hand and I will be happy to come by and assist you. Please don't write in the learning strategies instruction packet, but do put your name on all other materials.

Stop when you finish the top of page 3 where the word stop has been written. (Students now read booklet until they have finished Imagery Section.)

Are there any questions?

Now would someone like to give me an example of an image they came up with?

(Experimenter discusses example and gives feedback)

Would someone else like to give an example?

(Discussion and feedback)

Now, please return to the booklet and read the next section.

(Students read Elaboration Section)

Are there any questions?

Would someone like to give an example of how they elaborated the reading?

(Discussion and feedback)

Does someone else have an example?

(Discussion and feedback)

Now, please return to the booklet and read the last section.

(Students read Grouping Section)

Are there any questions?

Would someone like to give an example of a grouping they came up with?

(Discussion and feedback)

Does someone else have an example?

(Dicusssion and feedback)

Are there any questions?

Please pass the packets back to me.

Here is your first practice reading. Read it carefully and try to use as many of the methods and strategies that you have read about as possible. Write them down on the scratch paper as you go and I will come around to see what and how you are doing. Remember, this is not an intelligence test. You are helping us to learn about the effectiveness of these strategies. So work hard and carefully. We have provided the paper and the pencils. Put your name on all the sheets of paper you use. Write down a brief description of your aids as you go. You will have 7 minutes to read the passage and use the strategies.

Are there any questions?

Go ahead--begin.

(Give them a 2-minute warning.)

Stop please.

Here is another practice reading. Read it carefully and try to use as many of the methods and strategies that we have been discussing as possible. You will have 7 minutes for this reading.

Are there any questions?

Begin reading.

(Give them a 2-minute warning.)

(Repeat for additional readings.)

Testing Instructions

Reading Tasks

You will now be given two readings, one at a time, to see how well you have learned and can use the strategies. Read them carefully, and use as many of your strategies as possible to learn the content. Remember to use

imagery, elaboration, and grouping. Use as many of the strategies as possible, but certain of the strategies may be more appropriate for certain types of material than others. Use these strategies in your mind only. Do not take notes or mark on the readings. After you have been given time to read the passage and use the strategies I will collect the readings and give you some questions to answer about what you have read. You will have 3 minutes to read this first passage.

Are there any questions?

Begin reading.

Stop reading and please give me the materials.

Here are some questions about the passage. As you work through them recall your strategies to help you answer the questions. You will have 6 minutes to answer the questions. Please write neatly, and put your name at the top of the page.

Stop. Please give me your answers to the questions. Make sure your name is on the sheet.

Here are some more questions on the same reading. As you work through them again recall your strategies to help you answer the questions. You will have 3 minutes to answer the questions.

Stop. Please give me your answers to the questions. Make sure your name is on the sheet.

Here is your second passage. Read it carefully and remember to use as many strategies as possible to learn the content as you are reading. You have 5 minutes to read this last passage.

Are there any questions?

Begin reading.

Stop reading and please give me the materials.

Here are some questions. As you work through them recall your strategies to help you. You will have 6 minutes to answer the questions. Make sure your name is on the top of the page.

Stop. Please give me your answers to the questions. Make sure your name is on the sheet.

Here are some more questions on the same readings. As you work through them recall your strategies to help you answer the questions. You will have 4 minutes to answer the questions. Make sure your name is at the top of the page.

Stop. Please give me your answers to the questions. Make sure your name is on the sheet.

APPENDIX E

Student Packet for the Training Group in the

Training Versus Instruction:

Cognitive Learning Strategies Study

Sample Passage

Like Marcel, I believe that, in its present form, the school should be abolished. I would preserve a few of the facilities of the school--the library, the assembly hall, the gymnasium, the playing field--but as facilities only. Young people could use these for studying and for group activities, such as games, playacting, and musical performances. Instead of going to school for an education, the young person would go to a teacher. Student and teacher would meet in the teacher's home, or in the student's, or, if appropriate, on location. Sometimes the student would come alone, and sometimes with friends. I believe that under this arrangement the student would accomplish much more and in much shorter time than he does now. For the teacher would meet the student where he individually is.

I realize that this is a highly radical proposal and will be called impractical. But today's public schools are little more than a hundred years old and when first conceived, were also called radical and impractical. I cannot help recalling the kind of school that J. D. Salinger's Teddy wanted. He would first "assemble" the students and "show them how to meditate." He would "try to show them how to find out who they are, not just what their names are and things like that...." He would even try to "get them to empty out their heads" of all the stuff their parents and others had told them. If, as Camus said, "There is a whole civiliza-

tion to be remade, "Teddy's school would be an ideal way to start remaking it. As I have said before, teachers alone cannot rebuild a civilization. But they can do much to educate individual pupils who may one day set about doing so.

George Kneller, Foundations of Education, 1971, p. 264.

Training Instructions

This study is concerned with how well people can learn the contents of a written passage. We are going to use this sample passage to demonstrate a number of different methods or strategies that should help you learn the material. We will work through this sample passage a number of times so you can see what I mean by each of the different strategies. Then you will practice the strategies on new passages. At the very end we will, together, test the effectiveness of the strategies on other passages.

Take your time and read this passage carefully. (Please refer to SAMPLE PASSAGE.)

All of the strategies that we will be learning are aids in organizing, remembering, and adding meaning to what you read. We are going to learn them one at a time so you can get a feel for each of them. Then we will apply all the strategies to this sample passage.

The first strategy deals with what is called mental imagery. The strategy using mental imagery calls for forming a picture in your head of the person and events you read about in the passages. For example, if you read a story about a boy named Joe who went to France, you might picture Joe Namath atop the Eiffel Tower. This is what is meant by mental imagery. We are going to concentrate on these images to better

learn the material. For example, in the sample passage, "...in its present form, the school should be abolished. I would preserve a few of the facilities of the school--the library, the assembly hall, the gymnasium, the playing field--but as facilities only." This thought could be expressed using two connected images. First, imagine the abolishment of a school physically--picture your old high school and visualize a huge ball and crane smashing down its walls. The second part of the quotation could be imagined by calling parts of your high school building back into existence, much like a motion picture running backwards. Once the school is back together think of it as being there without any people in it.

Another example is to picture a group of young people playing basketball in the gymnasium or football on the playing field.

A fourth image might be to picture a boy named Teddy assembling a group of students on the football field and teaching them to sit cross-legged and meditate.

Additionally, you might imagine a picture of students going in groups to an assembly hall to listen to a speech by J. D. Salinger. Afterwards, they run to the gym and the playing field where some students sit and meditate on Camus.

In another image you might see a group of radical students outside the assembly hall protesting archaic educational methods and threatening to abolish the schools.

Or you might picture a large empty gymnasium with one teacher and one student sitting in the middle of the floor discussing the rebuilding of civilization. The next day you see them as brick masons actually building this new civilization.

A further image might be of a big teddy bear with J. D. Salinger written across its front going around shaking all the worthless stuff out of students' heads.

Take a few moments and try to do what we have just done with another part of the first paragraph of the sample passage. Try to think of several examples, and make notes about them on the scratch paper.

When you are through using mental imagery on the sample passage, stop so we can discuss a few of your examples.

The second strategy has to do with making what you have read more meaningful through an elaboration process in which you ask and answer certain types of questions. As you read through a passage, you could ask and answer questions in which you actively process the information. Such questions might be: "What is the purpose of this material?" or "How does this relate to my experiences, beliefs, attitudes, and emotions?" or "How would most people react to this?" or "What are the implications of what is being said, if it were actually done?" or "What are the logical relationships in the material? Does it make good, common sense?" There are other questions that can be asked and answered--this gives you some idea of what to look for and what to do.

In the sample passage you could ask the question, "How does this relate to my experiences, beliefs, attitudes, or emotions?" One response upon reading this passage might be to say to yourself, "The guy who wrote this must have been reading my mind. He knows exactly how I feel about our system of public education and the kind of experiences I had in school. As it is now, people don't learn much of anything!" Or I might say to myself, "Wow! The person who wrote this must be some kind of radical nut. Doesn't he know the 60's are over? Our schools aren't

perfect, but they're still the best in the world. I remember some good learning experiences I could not have gotten with Kneller's (the author of the sample passage) approach."

You could also try to draw logical inferences as you read; for example, you could ask the question, "If everybody felt the way Kneller feels about schools, what kind of a country would this be? How might young people be different if they did not have to go to school as much as they do now?" Then, your reply to the question you just asked might be, "This would be a very different type of country if our system of education were changed as radically as Kneller suggests. Young people would either learn to manage their time and activities personally, or they might turn to a very wasteful approach to spending their day."

These are examples of asking and answering questions about things you read, calling upon a personal elaboration of both meaning and meaningfulness. The more of these types of questions you can think about and answer the more able you are later to remember and use the information, thoughts, or ideas you are trying to learn.

Another way to elaborate the material would be to think about the purpose or need for the material. You might ask such questions as, "What is wrong with our educational system that would cause anyone to criticize it?" Or you could relate it to your own characteristics by asking questions such as, "Would I be able to learn in a school system such as Kneller proposes?" Further, you could ask if other people, in general, would also benefit from such a system, or would such a system even work in a society like ours. How would other people react to this passage? Would they agree with it, or be shocked by its ideas? These are further questions you might ask yourself to help you understand or

remember the material better.

One other way you might elaborate upon this material would be to look for common sense or logical relationships in the material. Some passages form concrete logical relationships naturally whereas other passages lend themselves more to abstract logical relationships. This particular passage is an example of one that presents abstract relationships. For example, if the school in its present form was abolished, then it would be common sense to assume other alternatives such as the one suggested by J. D. Salinger's Teddy.

Take a few moments and use one of the suggested questions or one of your own and apply it to the sample passage. Please make notes about the ideas or examples you come up with, using the scratch paper to write on. When you are through using meaningful elaboration on the sample passage, stop so we can discuss a few of your examples.

This next approach is actually a combination of a couple of strategies. This time you will look at a part of the sample passage and group information. Then you could use mental imagery or form a sentence to make the grouping more meaningful. As you read something, certain ideas, facts, and names may occur. As they appear in a passage it is helpful to be able to place these ideas, facts, or names into some category. This enables you to learn by joining together what were before loose facts. You could then generate a mental image or sentence using all the members of this group. For example, in this passage four names are mentioned: Marcel, J. D. Salinger, Teddy, and Camus. You could invent a category called "People in the Passage" or some similar grouping title to give you some handle on this portion of the reading. Examples of a sentence or

phrase using these four names might be, "Camus sounds like canoe, Marcel sounds like 'oh-well'--oh, well, J. D. and Teddy are riding in the canoe." Even more meaning could be had by picturing a mental image of a teddy bear, a juvenile delinquent, and poor Marcel, actually riding in a canoe. This same approach of categorizing things and elaborating on them as you go can be applied to any part of the passage as long as the grouping makes sense to you. It may not be meaningful to anyone bu you. In fact, the person next to you may think you're strange for grouping <u>those</u> things together. Regardless, if the group makes sense to you, it will help you learn the passage.

Take a few moments and apply this strategy to some other ideas or facts that are in the sample passage. The important thing is to make things more meaningful to you. Please make notes about the examples or ideas you come up with, using the scratch paper to write on. When you are through with this strategy, stop so we can discuss a few of your examples.

APPENDIX F

Student Packet for the Instruction Group

in the Training Versus Instruction:

Cognitive Learning Strategies Study

This study is concerned with how well people can learn the contents of a written passage. We are going to teach you several strategies for learning and remembering the content of written passages. Then we will, together, test the effectiveness of these strategies on a couple of passages.

All of the strategies that we will be learning are aids in organizing, remembering, and adding meaning to what you read. I will tell you about them one at a time so you can get a feel for each of them. Then you will apply all the strategies to the sample passages.

The first strategy deals with what is called mental imagery. The strategy using mental imagery calls for forming a picture in your head of the person and events you read about in the passages. For example, if you read a story about a boy named Joe who went to France, you might picture Joe Namath atop the Eiffel Tower.

The second strategy has to do with making what you have read more meaningful through an elaboration process that has you asking and answering certain types of questions. Such questions might be: "What is the purpose of this material?" or "How does this relate to my experiences, beliefs, attitudes, and emotions?" or "How would most people react to this?" or "What are the implications of what is being said if it were actually done?" or "What are the logical relationships in the material? Does it make good, common sense?" There are other questions that can be asked and answered--this gives you some idea of what to look for and what

to do.

For example, suppose you were reading a passage concerned with radical revisions of public school education. The author of this passage suggests abolishing the schools as they now exist in their present form, but retaining several of the facilities, such as the gymnasium, assembly hall, and playing field. The students would be completely free to develop their own interests within these facilities. Instead of meeting in classes, they would meet with teachers on an individual basis. While this may sound like a radical proposal, similar suggestions have been made by other writers, such as J. D. Salinger and Camus.

To learn a passage such as this we could ask the question, "How does this relate to my experiences, beliefs, attitudes, or emotions?" One response upon reading this passage might be to say to myself, "The guy who wrote this must have been reading my mind, he knows exactly how I feel about our system of public education, and the kind of experiences I had in school. As they are now, people don't learn much of anything!" Or I might say to myself, "Wow! The person who wrote this must be some kind of radical nut. Doesn't he know the 60's are over? Our schools aren't perfect, but they're still the best in the world."

The next approach is actually a combination of a couple of strategies. In this case, we would group information, and then use mental imagery or sentences to make our grouping more meaningful.

As you read something, certain ideas, facts, and names may occur. As they come in a passage it is helpful to be able to place these ideas, facts, or names into some category. This helps us learn by joining together what were before loose facts, into useful groupings. Once you

have this group, try to make a sentence or image that uses the items from the group. For example, if a passage contained the names of four people, Marcel, J. D. Salinger, Teddy, and Camus, you might group them together by inventing a category called "people in this passage" or some similar grouping title. This would give you some handle on this portion of the reading. An example of a sentence using these four names might be, "Camus sounds like canoe, Marcel sounds like 'oh-well' - oh, well, J. D. and Teddy are riding in the canoe." Perhaps even more meaning could be had by picturing a mental image of a teddy bear, a juvenile delinquent (J.D.), and Marcel actually riding in a canoe. This same approach of categorizing things and elaborating on them as you go, can be applied to any part of the passage as long as the grouping makes sense to you. It may not be meaningful to anyone <u>but</u> you. In fact, the person next to you may think you're strange for grouping <u>those</u> things together. Regardless, if the group makes sense to you, it will help you to learn the passage.

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